

## The Menagerie at the Botanic Gardens.

BY H. N. RIDLEY.

The collection of living animals in the Botanic Gardens in Singapore dates from the days when the gardens were the property of the Agri-Horticultural Society. This society was founded in 1859, but not finding sufficient support from the general public to develop and maintain the grounds adequately, eventually made over its property to the Government in 1874, and in 1875 Mr. J. Murton was appointed Superintendent. The Zoological part of the garden seems however to have been at first under the control of Mr. Krohn, who publishes in 1876 a report on the Zoological collections. That year Mr. Cheang Hong Sin presented a monkey house to the gardens, which still exists, and a list of the animals in the gardens was published. It included a rhinoceros, sloth-bear, kangaroos, and other animals, and a number of birds. In 1878 it was decided to dispose of the larger animals and most were sent to the Calcutta Zoological Gardens. Birds, monkeys and small animals were however kept. From 1888 the aviaries and enclosures were increased, and till 1902 the collection became very representative of the fauna of the Malay peninsula and islands. No funds were granted by the Government for its up-keep after 1881, but its expenses were paid out of what could be spared from the Gardens Vote. Many of the animals and birds were presented by various donors, so that the expenses were merely feeding, and housing. The cost being from about £100 to £150 per year when the collection was at its largest. In 1902, an admirer of Zoological Gardens urged that the collection was worthy of a better class of houses than could be afforded from the Gardens Vote, and an estimate for improved and more ornamental houses was prepared, but it was considered too expensive by the Government, and an

order was received to abolish the menagerie in 1903, which had to be gradually carried into effect.

Perhaps there are few places in the world more suited for a Zoological Garden than Singapore. The climate is well suited for all the tropical animals, the cost of keeping them is much lower than in most parts of the world, for firing, an important and expensive item in many gardens, is unnecessary; forage for the deer and other herbivorous animals, costs little or nothing, and fish for the piscivorous birds is readily procured. Animals of great interest can be procured for a small cost, and indeed a great number have been presented and offered to the gardens. The neighbouring islands and mainlands produce many animals which cannot be kept in any of the European or American Menageries, but which thrive well in Singapore, and even breed in captivity. Notable successes in this way in the Singapore Gardens are the successful breeding of the Jackal, the Kijang, (*cervulus muntjac*) the Napu (*Tragulus Napu*) and the hybrid monkeys and the green viper none of which, as far as I know, have previously bred in captivity elsewhere.

To the large number of passengers who visit Singapore on their way eastwards or westwards a Zoological collection is very attractive, and the menagerie in its best days was known all over the world, and was the first thing asked for by the visitor. There seems also something eminently suitable in having a menagerie in the colony founded by Sir Stamford Raffles who was also one of the founders of the finest Zoological Gardens in the world,—that of London.

*Animals in captivity.* There are a certain number of people in the world who assume that an animal must be very unhappy in captivity, and especially if their ideas of what any given animal should enjoy do not concur with those of the animal itself. I suppose all keepers of menageries have received from time to time the most ridiculous letters with suggestions as to how to treat animals, of which the writers often know not even the name still less the habits. The descendants of the man who buttered the hay for his horse are by no means extinct.

When the Gibbon (*Hylobates*) was proudly giving its well-known solo in its best style to an audience of globe trotter's, one mistaken individual rushed wildly into the office to say that the monkey was in great pain and making a great crying. On another occasion a lady wanted someone to be prosecuted because a fine tigress called regularly at sundown, and she thought it must be ill. Others whose idea of the shape of a living tiger was based on a badly stuffed Museum specimen think that a tiger whose body is not like a bolster must be starved, whereas a tiger is almost a greyhound among cats when in good condition.

As a matter of fact animals as a rule not only become quite accustomed to captivity in a very short time, but usually prefer it to a wild life. They get their food regularly and without having to hunt for it and can spend the rest of their day playing about or sleeping. Animals which have been in cages for quite a short time are helpless when they are turned loose or escape. People who have kept pet monkeys and on going home wish to get rid of them sometimes turn them loose in the Garden Jungle to join the other wild ones, which is as considerate as to send a child away to find and make friends with a tribe of savages. The monkeys thus released dare not go near the wild ones, do not know how to get food, otherwise than by going to the nearest house where they sometimes arrive in a starving condition. Some pelicans presented to the Gardens after remaining in an enclosure for less than a day, were put on the Garden Lake, where were plenty of fish. They got off the Lake at once and stood on one of the roads flapping their wings and opening their beaks at any carriage which came by to the alarm of the horses. Then they walked straight back to the enclosure and waited outside the door all night till the keeper returned and let them in. Some phalangers which escaped one night were very puzzled what to do. All but one sat on the top of the cage all night. The remaining one rambled aimlessly along the path where it was found next morning. Squirrels, musangs, and such small animals if they escape usually take to the woods naturally, but often remain near the cages for a long time before they disappear. If an

animal dislikes captivity at all, it is easily seen. It mopes, or is restless, feeds only when no one is by, and is certain to pine away soon. The big civets *Viverra tangalunga* and *Pagurus lencomystax* particularly dislike a bright cage. Being nocturnal animals, only coming out after dusk, the light annoys them very much and the *Viverras* dislike being looked at by a crowd of people and become very nervous. To put these animals in a fine open cage that looks nice from a popular point of view is cruel. The cages should be half dark, when the animals do very well and live for many years. Curiously some animals and birds much prefer small cages to large ones. Some love birds (*Loricula galgulus*) were put in an ornamental canary-cage, which one would have thought they preferred to the round rattan cages in which the Malays keep them and in which their heads nearly touch the top. This did not suit them at all, and nearly all died in a few days. The remaining two were put back in the Bamboo cage and lived quite well and happy.

The only way of knowing what an animal thinks is comfortable and snug is to keep it and observe its ways. It will soon let you know what it likes, which probably does not at all fall in with your ideas of what it ought to like.

#### AN ACCOUNT OF ANIMALS KEPT.

##### *Quadrumana.*

*Simia satyrus*, L. The Mias. Orangoutan.

This has often been on view. The animals are obtained from Sumatra and Borneo and are usually young, but very large adults have not seldom been brought to Singapore. Young Mias are very quiet and tame, but full grown adults are dangerous and require a very strong iron cage. The animal is very delicate and liable to a disease resembling cholera which seems almost invariably fatal. A good deal of the art of keeping one healthy consists in giving it a varied diet. Bread, boiled rice, pineapple, plantains, eggs occasionally, sugarcane, kangkong (*Ipomea aquatica*) or some such green stuff suits it well. When young and not



dangerous it is allowed to go out for walks by itself every day, to climb on the trees, and amuse itself. It requires a box or basket to sleep in with a rug, or bit of sacking to wrap itself with. It appreciates alcholic liquors especially if sweet, such as port but it will often take whisky or beer. One which is now in the London Zoological Gardens smoked cigarettes or cigars, lighting one from the other, knocking off the ash, and puffing the smoke through its nose.

The Mias is always a quiet slow moving beast, and being constructed for arboreal life is not in its element on the ground. It is very human in the way it uses a blanket and pillow, carefully arranging the pillow under its head, and drawing the blanket over itself, and when it has arranged this to its satisfaction and lies on its back peacefully smoking a cigarette, it looks more than ever like an indolent man. Young ones rarely make any sounds with the mouth, but when quite young if annoyed it cries like a child, stamping its feet on the ground. When older, about 4 or 5 years old the Mias does not cry, and seems to be almost dumb, occasionally grunting, and blowing with its lips when vexed. They laugh however when tickled, and often, at about seven years old quite loud. The last one kept in the Gardens, was very fond of swinging on a door, sitting on the top and pushing itself backwards and forwards like a child on a gate. When young they are very docile and obedient and very much attached to anyone who is kind to them. Many are fond of having a common monkey to pet and play with, others seem to find the small monkey a bore, and a nuisance.

When pleased with anyone they protrude their lips to kiss them, and they often kiss each other.

The youngest I have seen were a pair brought for sale, undoubtedly twins as they were exactly the same size, and age. They were very scantily provided with hair. The male was very active, moving about briskly like one of the common monkeys. This baby-activity soon goes off and as they become older they seem to become more indolent.

As they grow the hair becomes longer and denser especially apparently in the male, but later in life they often

appear to lose the hair on the body to a considerable extent, and the female sometimes at least becomes almost nude about the breast and abdomen when she gets near the breeding age.

All evidence we have seems to show that the Mias develops at the same rate as a man, the teeth changing at the same period of life. Practically however nothing is known of the later development.

There are undoubtedly several forms of the Mias, perhaps species differing in the presence or absence of fleshy flanges to the face, size of apparently full grown animals, and color of the hair, which varies from bright orange colour to dark brown.

*Hylobates syndactylus.*

The Siamang is very seldom to be procured. I only remember to have seen two in captivity. One of which a very young one was in the Gardens for some time. When happy it makes a very loud booming noise, which can be heard far away. A young one brought for sale by a Malay, lived in a cloth bag, into which it would jump and its weight pulling the strings closed the bag, in which it would sleep curled up.

*H. Agilis.*

The Wawa, is one of the most popular pets, and lives well in captivity, and a number have been kept in the Gardens menagerie. There are three colour varieties; black with a white face the commonest, white, and grey the scarcest form. They are usually very gentle unless illtreated, and always give pleasure to visitors by their marvellous agility, and by their weird song or wail. They usually sing shortly after sunrise, and in captivity also often when there are a number of visitors looking at them. They have few other sounds, a kind of low plaintive wail when they are very friendly, and a kind of grunting when they are on heat, are all the noises they make. The food is boiled rice, fruit, sweet potatoes, bread, etc. They have never bred in captivity.

The Wawa often lives a long time and specimens have died of old age in the Gardens; but there was no clue to their age. The chief disease they are liable to is pneumonia from a chill,

especially during heavy rains, and on one occasion an infectious stomatitis, killed two Wawas and a Siamang, all in the same cage, very quickly.

*Semnopithecus.*

The long tailed monkeys known as Lotongs are not at all easily kept in confinement. Even the Malays consider them very difficult to keep. The following species have been kept for a longer or shorter period.

*Semnopithecus cristatus.*

A specimen of this handsome monkey only lived a short time dying rather suddenly, apparently from heat.

*S. rubicundus.*

A very old specimen was obtained and kept for a short time. Its bright red fur and light blue face gave it a most comic appearance, which was increased by its looks of indignation when it was laughed at.

*S. maurus.*

A black species was kept also for a time.

*S. sp.*

A quite white monkey said to have come from Sumatra, lived for a short time, but it was very old and died of old age not very long after it was obtained.

*Macacus cynemolgus.*

The K'ra, has always been kept on view. It is a very easy monkey to keep and breeds readily in confinement. There are a number also wild in the Gardens.

*M. fasciatus.*

The Japanese monkey; one of these was deposited for a time in the Gardens.

*M. nemestrinus.*

The Berok was always kept, a monkey very easy to keep but which never breeds in confinement so far as I know.

Hybrids between *M. cynomolgus* and *nemestrinus* however are readily bred.

*M. umbrinus*.

The Nicobar monkey resembles the K'ra, but is darker in colour and much larger. One presented by Dr. Abbott became pregnant by a K'ra, but both mother and child died shortly after the birth, apparently from weakness.

The first hybrid monkey that was produced was the offspring of a male K'ra with a female Berok, in 1895. He is still alive in the Zoological Gardens, London and a very handsome powerful monkey, but became rather savage, attacking the other ones in the cage and had to be separated. He quite combines the appearances of both the parents, his long face, and habit of walking on all fours reminds the observer of the Berok, his fur is colored like that of the K'ra, the tail is much longer than that of the Berok, but much shorter than that of the K'ra, and he carries it elegantly arched, like a lion, his keeper would say. He was sent to the English Zoological Gardens in 1905, where he is at present.

The other hybrid was between a male Berok and a female of the short haired *Cynopithecus niger*. In the same cage was a very savage male *Cynopithecus niger* of the long haired form. He would not breed with the other *Cynopithecus* and did not seem to take any notice of her. The female became pregnant but died at parturition being unable to deliver herself of the young one, and owing to the ferocity of the male no one could go into the cage to assist her. The young one was fully developed and had some characters of both parents. It was preserved in spirits at the museum.

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### General Notes on Monkeys.

So little seems to be known as to the habits of the commonest monkeys that the following notes may be of interest.  
*Macacus cynomolgus*.

The K'ra is the commonest and most conspicuous species here. It inhabits edges of jungle and small woods but seldom goes into high jungle. The animals live in small families

presided over by a large male. There has long been a number of this monkey in the Botanical Gardens jungle, but of late they have diminished in numbers owing to the clearing away of the woods in the neighbourhood, and the failure of food supply due to this is probably the reason of their diminished numbers. There are now two families of them, one in the Upper Garden and one in the Economic Garden. Each of these families consists of two or more adult males, some younger males and a number of females. It would be perhaps incorrect to say that all these are descended from a single pair, or two pairs, but as there has not apparently been any admixture of fresh blood for very many years, they must all be very closely related. It is true that residents have on several occasions released their pet monkeys in the gardens so that they can join the wild ones, but the freed ones do not usually do so but almost invariably go to the nearest house for food and remain there till they are either caught or shot as nuisances. In a family of monkeys no stranger is admitted without a fight. If a female is put with the family the females attack her. If a male the males attack him. He or she generally gets badly bitten and sometimes killed. If the stranger can hold his own he may be accepted, and eventually may, if powerful enough, become head of the clan. In fighting, the top of the head and the thorax are the points generally attacked.

A Berok, *Macacus emestrinus* of no great size but a powerful monkey, during the absence of the keeper, broke his way into a cage of kras, and was set upon; when rescued he was found nearly insensible with the scalp torn and hanging from the top of his head and a bite through the thorax into the lungs, whence air was issuing. He completely recovered in about a week, or so, and lived for several years, when again he broke the cage and got among the enemy. Though a powerful monkey he offered practically no resistance and this time received a bite on the thigh, which would have been of no importance but it got infected with tetanus of which he died in about three days.

A great fight took place among the wild monkeys in the gardens on one occasion, between the old king monkey and a



younger one; probably however some of the other males joined in. A couple of days afterwards the old veteran was found in the morning lying dead by a waterbutt, with his throat cut across, and some other fresh wounds, and his shoulder swollen and gangrened from injuries received in his first fight. He was sent to the museum to skeletonize when it was found that at some much earlier date three ribs had been broken and had mended again.

The leading monkey having established his position, takes his food first, and has his selection of the females first. The other males he drives away should they presume to attempt to usurp his rights. In processions from one place to the other he always comes last, but if one of the younger monkeys gets into a dangerous position or is attacked he always runs to its rescue, and drives off the enemy, and the other big males often assist him if necessary. The wild monkeys always sleep in particular trees, those with bare branches and very lofty, and towards evening they may be seen slowly moving along, stopping here and there to eat, till they reach the sleeping place about sundown, they then settle down for the night, sitting usually in pairs or singly on the bare boughs. The same tree is occupied every evening for weeks at a time, and wherever they are in the evening they make for the same spot. They never sleep in a bushy tree, probably for fear of being surprised at night by snakes. Young monkeys are always born in the early hours of the morning before daylight, as almost if not all mammals are, and are born in the boughs, or if in a cage on the perch; never I believe on the ground. In cases of difficult parturition at least, the other females act as accoucheuses, with sometimes disastrous results to the baby. But difficulties in births are rare even in the cage and I have only seen one or two. The K'ra breeds very easily in captivity, the females producing one at a time about once a year. The young one when born has black hair which gets lighter colored with age. The Berok *Macacus nemestrinus* does not breed in captivity; at least it has never done so with its own race in the gardens. But it has been successfully crossed with the K'ra, and also with *Cynopithecus niger*.



I have occasionally seen old monkeys which appeared to be insane, incessantly gibbering at nothing and behaving in a quite meaningless way. It might be said that it would be difficult to tell whether a monkey was mad or not, as their ordinary ways of going on are so wild, but as a matter of fact, any one who observes a sane monkey closely can see why it behaves as it does, and what it means by so doing. Often monkeys, Beroks especially, invent comic tricks to amuse on-lookers, thus one used to pass its hindleg over its neck, and beat it on the ground and pretend it could not get it back, but these tricks are evidently games invented for fun. Out-breaks of maniacal ferocity occur also in ordinarily quiet monkeys, and these are commonest at night and apparently in the very early hours of the morning, about 4 or 5 a.m. A male monkey ordinarily quiet thus attacked a female whom he was very fond of and inflicted severe injuries on her, destroying the sight of one eye, from which injuries she never recovered properly, but wasted away, and after producing a still born young one died.

The monkey which attacked her seemed very sad when he was found next morning, and sat by her all day trying to console her. This is not the only case of this nocturnal ferocity. I have seen among these monkeys, and cases of ferocious murder in human beings at about this period of the night are too common as is well known. Monkeys of course often quarrel for more or less valid reasons both in a wild state and in the cage, and bite each other spitefully. When one would bite the others it was found quite sufficient to nip off the tips of the canine teeth with a pair of strong wire snippers. It does not hurt the animal at all if properly done and the teeth do not decay, and when he finds he cannot bite through the skin of another monkey he gives it up. Old monkeys often have the teeth decayed, and worn away, but they never seem to suffer any pain from decayed teeth, and I have never seen any inflammation of the jaw caused by them.

The K'ra is a very loquacious animal and has an extensive vocabulary in which respects it is very different from the anthropoid apes, who seldom speak at all. Some of the noises of the K'ra have quite obvious meanings, thus the word

Krra from which it takes its Malay name, is only used as an alarm note for a man or dog in sight. A quite different sound is used for a tiger or perhaps for any large animal. If a young monkey gets into a small tree and alarmed at the approach of any one utters its little squeaks of fright, and is afraid to try a long jump into the safety of a taller tree, the king monkey comes as near as he safely can do it and utters a peculiar grunt "umh" "umh" till the little one makes a wild spring and escapes from its peril. Meanwhile the old one threatens the enemy with an entirely different bark at intervals. This latter sounds much the same as the cry that two males quarrelling begin their abuse of each other. Young monkeys have also a number of plaintive cries which do not seem to mean anything and which older monkeys do not use.

When the monkeys see a snake they get very excited and make a great chattering. On one occasion when a terrier was attacking a cobra, the monkeys came from some distance to the scene of the fight, so close I could almost touch them, and quite regardless of me and the dog, peered down to see if they could see the snake which was hidden from their sight in the thick fern. I presume they judged from the noise the dog was making what he was attacking, or they may have heard the snorting of the cobra, when they were close enough. The duration of life of these smaller monkeys seems to be about 20 years, but I cannot be certain of this. The hybrid Kra-Berok is now 11 years old and is in very fine condition showing no signs of age. The big black *Cynopithecus*, which was full grown, and probably 8 or 10 years old when he was obtained, lived for 10 years in the gardens and died of old age. Several other monkeys have died of old age, but they were old when they were obtained. Monkeys do not suffer from consumption here as they do in Europe. The causes of death of the monkeys in the gardens, have been, beside old age, pneumonia, not rare in the Wawas (*Hylobates*), stomatitis (three *Hylobates* apparently an infectious disease which killed all three in one cage; tetanus (one); and fatty degeneration of the heart. Two bading monkeys died of this from over feeding. Being very greedy and always getting the first food, they got

so fat that the heart was quite enclosed in cushions of fat. One, and if I remember correctly, the other fell dead after a Chinese holiday, when crowds of people came and gave the animals so much food that the orgy proved fatal.

*Cynopithecus niger*.

Both forms of this monkey have been kept in the Gardens Menagerie. The short-haired form from Celebes and the long-haired one from Batchian. I cannot find in any books that these two apes have been separated specifically anywhere, which is rather remarkable, considering how the mammals have been divided up on very scanty characters by Zoologists. The short-haired form is the commonest, and is often brought into Singapore by the Bugis men. The long-haired one, a bigger ape, is very distinct not only in size and length of hair but it also possesses a large patch of grey hair on the buttocks. Only one of these has been on view in the gardens, a fine male. He was received when apparently full grown in 1891 and died of old age in 1905. He was a very vicious and powerful ape when he first came, and it was unsafe to go into his cage, as he flew at the throat of any one who attempted it. Later he became much quieter, but was never really safe. This monkey was the only one I ever saw who had any idea of throwing. He threw stones over-hand as a woman does, with considerable accuracy, and visitors often threw stones into his cage which he hurled back at them through the bars and on some occasions hit a visitor on the head or face. One lady indeed got a cut on the mouth from a stone she had imprudently thrown to him. When pleased with any one he would turn his back and standing erect often on one leg would grasp the back of the left thigh with the right hand. (*Macacus nemestrinus* often does the same thing). When he drank from a tin, it was his delight to suddenly throw the tin and the rest of the water over the keeper who was giving it to him. Though confined for some time in a cage with a female of the short-haired form he never attempted to breed with her, nor was otherwise than friendly with a male Berok who was in the same cage and bred with the female. The short-haired black ape is very good-tempered usually, but very mischievous.

I have seen one on board ship seize the cap from one passing by and throw it overboard. Two which were put temporarily into an empty tiger's cage soon escaped by unroofing part of it, throwing the tiles down and speedily making a hole large enough to escape. When the coolie got on the roof with a sack to throw over one, it suddenly pulled the sack from his hand and rushed off with it. These monkeys live a long time and suffer little from sickness. One was killed by stomatitis, and some died of old age.

They are affectionate apes, and recognize acquaintances readily. Two which were bought by a passenger and kept for a short time in the gardens were sent to the London Zoological Gardens, where I saw them about a year later, when they immediately recognized me and came down to shake hands, though the keeper advised me that they were savage! Common and easily procured here, they seem to be seldom sent to European Gardens.

*Nycticebus tardigradus.*

The Slow Loris. This little lemur is common and often caught by the Malays, and many have been on view in the gardens. It does not seem to be long lived and is a dull creature in captivity, remaining curled up all day and only moving about slowly at night. Its food, in a wild state, consists of fruit, insects, and small birds. It seems strange that so slow and weak a creature should be able to hold its own in a country where there are so many predacious animals, for it appears to have no means of defence. It is however not so harmless as it appears, as it can bite sharply, and its bite is poisonous. Two instances of injury from its bite have been described to me. Many years ago Mr. H. Everett while talking to his brother, one evening in Borneo saw one of these little animals in a ditch and picked it up. It bit him on the hand, and he threw it down. His brother was walking away, and though Mr. Everett could hear his footsteps now in the distance he was unable to call him. His mouth and tongue swelled up, and he was unable to walk. He attempted to crawl up the hill to his own house, but only managed to get

there next morning. When found he was unable to speak, with his tongue protruding from his mouth. His clerk who found him, cut the clothes round his neck, and managed eventually to recover him. In the second case a lady in Singapore was bitten by a Loris on the hand, and her mouth and tongue swelled up very much, but the swelling went down towards evening. No other part of the body seemed to be affected by the bites. The natives all know of the danger of the bite of the animal, but it is said that it is only dangerous when fresh caught, and after it has been in captivity for some time it is not poisonous.

The weird appearance of the Loris with its large round eyes, and its habit of covering its face with its paws has given rise to many tales concerning it. It is supposed to have the faculty of seeing spirits, which is why it covers its face, as presumably it does not want to see them. Its use in native medicine with other superstitions about it have been published in the Journ. Roy. As. Soc. S. Br. vol. 34.

*Galeopithecus volans.*

The flying lemur, is common in many of the Singapore woods, but it is not easy to get or keep in captivity. I have had young ones taken from the mother when killed twice, and endeavoured to rear them. They took milk readily but died in a few days from cold, as it seemed impossible to keep them dry. An adult captured in Singapore was kept for some days, and was being taught to live on bananas, when it managed to escape. In a wild state they live on leaves, the intestines of those killed being usually packed with nibbled up leaves, but the animals in captivity would not eat such leaves as I offered them. Their cry in the forests resembles the quacking of a duck.

FELIDÆ.

*Felis tigris.*

Five or more tigers have been kept in the garden at different times. They are always easily procurable, but usually the funds of the garden were not large enough for the keep of so



expensive an animal. Two cubs were kept for a short time in order to train them to eat meat previous to shipping them to Europe. They were about as big as large cats, with ridiculously large heads and paws. Remarkably tame and friendly, they would follow me about the garden for short walks, putting up their tails and rubbing their heads against my legs like tame cats. In a few days they had learnt to eat meat instead of requiring milk, which was difficult to get on board ship, and Sir Charles Mitchell, then Governor, who owned them, had them sent home to the Zoological Gardens. They were great pets on board ship, where they ran loose. They had grown as big as leopards when I saw them in England some months later, but were still tame enough to stroke. I heard afterwards that they died during the time of change of teeth, always a risky time with tigers. Before they were shipped a live chicken was put in their cage, and though the little animals had never seen one before, the biggest one darted at it and gave it such a blow with its paw that the chicken was sent flying like a ball against the wall of the cage falling dead instantly.

A fine young tigress taken from a nest in Pahang was presented to the gardens by M. Wise, in 1895 and lived there till 1903, when it was sold. She passed safely through the ordeal of changing her teeth, though considerable care had to be taken with her at that time, and she had to be dosed with santonine put in a piece of meat. She was usually very quiet, with Europeans at least, though she disliked natives, and would charge the side of the cage and strike violently with her paws if the keeper leant with his back against the bars, but never did so when he faced her. As the cage had to be enlarged for her, she had to be temporarily transferred to a travelling cage in which she could only just turn round. She was kept there for some weeks and when the large cage was ready she absolutely refused to leave the travelling cage, so that a fire of paper had to be made near the cage in the hope that the smoke might induce her to go into the large cage, but she took no notice till a piece of paper suddenly burst into flame, when she walked slowly into the cage and then made a



rush to the further end, and finding a wooden platform put for her to sit on, investigated it carefully by feeling with her paws underneath before she would sit on it. She was fed on pariah dogs, beef, or goat, and always supplied with grass which she would often take from the hand. She got tired of dogs after a time, and her diet had to be changed. Chickens she used to appreciate. First plucking all the feathers off she washed the carcase carefully in her water before eating it. She was also partial to rats, holding them in her paws and biting off the head and gradually eating them. Occasionally a tiger requires liquid blood, as otherwise it gets constipated, and this was always difficult to get, as she would not touch it if coagulated. A rhinoceros having died in the gardens she thoroughly enjoyed its flesh, and also drank the blood greedily. She very much delighted in rolling on her back in a shallow tank of water provided for her, especially on hot days. When she became full grown she took to roaring at sundown, and occasionally later, especially on moonlight nights, and her cry Ah-oum could be heard at a great distance. Like most of the local tigers she was very light coloured the fur being quite yellow. Another very fine tiger kept for some time in the gardens before being sent to Cairo, was of a rich chestnut brown. It had been caught in Sumatra. The food of a tiger costs about fifty dollars a month. Other examples were offered by H. H. the Sultan of Johore and other people, but the expense of keeping these big cats was too great for the limited funds of the gardens. A wild tiger inhabited the Garden Jungle for some months in 1893, having probably wandered there from Bukit Timah.

*Felis pardus.*

The Leopard though easily procurable, could not be kept on account of its cost in food. However in 1876 a spotted leopard presented by the King of Siam, was on view for some time, and a couple of cubs of the black panther were deposited in the gardens for a short time. The latter were very vicious, though quite small. They snarled and fought whenever any one came near them.

*Felis tristis.*

A full grown female of this large cat was sent to the gardens in a stick cage one night, and was put temporarily in part of the monkey cage. It however managed to escape from its travelling cage, and as it could not be recaptured with any safety it had to be shot. The carcase was sent to the museum.

*F. Temmincki.*

A golden cat was sent from Pahang in 1893, and lived for some time, when it suddenly died. It was a very quiet and handsome animal with its marbled orange tabby fur. It was one of the most placid cats I ever saw. As there was some difficulty in getting its travelling cage into the large cage, endeavours were made to get it to walk into its new home, but nothing would induce it to move. When squirted at with water it sat still and lapped up the water; when a smoke of brown paper was made it folded its paws and went to sleep. Finally the travelling cage was got into the large cage and broken to pieces, till at last the cat remained sitting calmly on the last bit of the box.

*F. bengalensis.*

The Leopard cat is the kind most commonly brought in for sale. It is a beautiful little animal, hardly as big as a good sized English cat, yellow with round black spots. When caught full grown it is usually extremely vicious. Two kept in one cage always watched carefully at feeding time for the keeper, to try and strike him with their paws when he opened the small side door to put the food in. Being nocturnal they are generally very quiet, hardly moving all day, and frequently only feeding at night. When caught as kittens they can sometimes be made as tame as an English cat. One kept for a long time by Mr. Hervey in Malacca was presented by him to the gardens where it lived many years, and was quite tame and would play like a kitten with anyone. Formerly it was kept loose in the house in Malacca but it got so very sportive and smashed so much glass and china that it had to be shut up.

On one occasion it got out of its cage in the gardens into a gallery at the back of the cages and no one could catch it. When I cornered it and stooped down to pick it up it sprang over my head, but it did not attempt to bite or scratch. It must have been 12 or 13 years old when it died, and I believe then it was killed by a cobra or other poisonous snake. Another kitten of the same species which was being trained to eat cooked meat, which is popularly supposed to induce tameness, died in the same way. The animals perfectly well on the previous night, were found with the head enormously swollen next day and died very shortly.

On one or two occasions there was an outbreak of a very-infectious disease among the cats, a form of diarrhœa and weakness, the cats dying always with their mouths full of the grass of their bedding. At first the disease lasted two or three days before the fatal termination, but later became more rapid, and the last of the cats attacked died in a few hours after it first showed signs of illness. Cats were not rarely sent down from the Peninsula or neighbouring Islands in small cages with a putrid fowl in the cage for them to eat. When they arrived they were found to have a violent diarrhœa which soon killed them. Being usually very wild it was difficult to give them any medicine, as they could not be handled. They were dosed by dipping a stick wrapped in cloth into the medicine and presenting it to the cat which bit it furiously so that the medicine ran down its throat.

*F. planiceps.*

The stump-tailed cat is a small grey and red cat with a thick blunt tail. It was formerly considered very rare, but at one time was one of the commonest cats sent to the gardens. It is usually a quiet cat, but I never saw one that was really tame. On one occasion a gentleman sent one which he said refused to eat and had eaten nothing for some days. I offered it fish and all kinds of tempting things, for it did not occur to me that the owner had never tried it with raw meat, but this proved to be the case, and when some raw beef was offered, it ate two pounds up as fast as it could. It is useless to try

to feed wild cats or any carnivora with cooked meat, they will never touch it, until they have been gradually trained to it, nor will any of them drink milk, though they may be trained to do so, especially if quite young. It is perhaps as well to point out that all these cats, including tigers, require grass and should be supplied with it.

#### VIVERRIDAE.

*Viverra zibetha*, and *V. tangalunga*.

The two big grey civets are often brought in by Malays. They are very handsome beasts, but do not stand captivity well, as they are usually very nervous and dislike being looked at. They live best in darkened cages as they cannot stand a bright light. During the day they are generally very quiet, and are active only at night. They are never vicious though seldom tame. Their food consists of fruit and meat, but like all these animals should be fed chiefly on bananas, papayas and such fruit, with only a little meat. One of the Tangalungas escaped from captivity on one occasion and lived wild in the gardens for a long time. It usually concealed itself during the day, but was often seen by the watchmen at night wandering about. I came across it during the day on one occasion, when the dogs pursued it but were easily beaten off. Wild ones have also been seen in the gardens.

*Paradoxurus hermaphroditus*.

The Musang. This is a very common animal, abundant in a wild state all over Singapore, and often inhabiting the roofs of houses. It is very easily kept in confinement and becomes very docile, especially when taken young, and can be trained to perform tricks, or to follow its owner about. It eats almost anything but lives chiefly on fruit. It does not appear to be a long lived animal, but it seldom suffers from any disease. Specimens brought by Malays however are very often injured in catching them. I have had one brought with its mouth sewn up with string, to prevent it biting. The string was quickly removed and the poor animal soon recovered its injuries. The common local form varies somewhat in

coloring, but comparatively small in size. The Javanese form, of which a specimen was presented to the Gardens in 1904, is a very different looking animal, much larger, with three distinct black stripes down its creamy white back.

*P. agurus leucomystax.*

The white-whiskered Paradoxure. This is a rare beast of a light brown colour with orange eyes. Three were taken in Singapore one year, and two of these were brought to the gardens, one was injured by a dog bite in catching it, and eventually had to be killed. The other lived for over ten years. A very quiet animal sleeping nearly all day, and occasionally moving about slowly. It is not vicious but is less docile than the musang. It eats fruit, chiefly bananas, and seems to be a long lived animal. It requires a darkened cage, as it dislikes a bright light.

*Arctogale leucotis.*

This pretty brown civet has been kept in the gardens for some time. It is very tame and is very fond of being stroked by visitors. One was sent to the London gardens in 1905.

*Arctictis binturong.*

The bear-cat has often been on view in the gardens. It is easily tamed and very long lived. One remarkably fine one was kept for 16 years. Its food consists of bananas and pineapple. It will also eat meat, birds, dried fish, etc. It was also sent to the Zoological Gardens in London in 1905.

*Herpestes mungo.*

A common Indian mungoose lived for many years in the garden, and was believed to have been intentionally poisoned eventually by a native who had one to sell. It is often brought to Singapore by natives of India. The one kept was very tame and amusing and spent much of the day playing with the dogs, as it was allowed to run about. It was an excellent ratter, and a great snake-killer.

*H. aureopunctatus.*

The small Indian mungoose, is also often imported into Singapore, and two were kept for a long time. They were very tame and playful.

*H. brachyurus.*

The water mungoose. Two of these have been kept for many years. One was presented by Dr. Johnstone who got it in Tringanu. The habits of this animal are very different from those of the two previous ones. It is never really tame nor is it at all playful. When annoyed it erects the bristles on its back whence probably the Malays call it Musang Babi. Its food is fish, but it is also partial to snakes.

*Cyon rutilans.*

The Malay wild dog. Two pairs of pups were kept for some time in the gardens, but one of the pair died soon after arrival, having been injured in catching, and the others were at different times poisoned out of spite by natives. This dog is a very handsome red animal with a beautifully plumed tail which when pleased it arches gracefully, but never wags it. It does not bark but makes a yapping noise. One used to spend much of its time rushing up the wooden partition of its cage for about 12 feet and dropping again to the ground. By bringing a terrier slut to the outside of its cage and stroking her the wild dog who evidently much admired her became tame enough to let me stroke it, and it was getting quite tame and very handsome when the native miscreant poisoned it. It is said that there are two kinds of wild dog in the Peninsula, one large and the other small, and this seems possible as one pair of pups were nearly as big as the last mentioned dog, though evidently very much younger.

*C. aureus.*

The Indian Jackal. A pair of these was presented to the Gardens in 1895, and after a short time bred producing five pups. Of these one when very small crept through a small drain-hole into the tiger's cage next to its own cage and was



seen no more. Sometime later one escaped and lived for a short time in low scrub off Holland Road, but at length disappeared. The others grew well for a year or two, but then all were attacked by distemper. All attempts to pull them through failed except in the case of one of the young ones which completely recovered and lived for many years till it was sold. I do not know if there is any other record of the Jackal having bred in captivity. In the Handbook of Animals kept in captivity in Calcutta Gardens it is stated that it has never been successfully bred there.

These Jackals are not rarely brought to Singapore from India by natives, and another was brought to the Gardens by an Indian on another occasion, but it was so much injured that I shot it at once. The natives say that Jackals never live long in Singapore as they always die of distemper here.

### *C. Dingo.*

The Dingo. A very handsome and tame Dingo of large size was presented to the menagerie in 1893. Though tame enough to be taken out for walks on the chain every day, it was unmanageable in sight of goats or chickens. When it was being brought to Singapore it used to run loose on the deck of the ship and play with the passengers but when two sheep escaped from the butcher's pen, the Dingo immediately dashed at them, and tore them to bits. During a spell of extremely hot weather he shed his thick coat and looked a very different animal. As he appeared to suffer much from the heat he was moved up to the stables as being cooler, but one night broke his rope and came upstairs into my house and lay down under the table whence nothing would induce him to move, and it was with great difficulty that he was taken back to his quarters. He did not attempt to bite or did he lose his temper but simply planted his feet on the floor and held on. The hot weather however was too much for him and he died a few days later.

A white Dingo was also sent to the gardens from Perth, as a great rarity, but had to be sent back to Australia, as at the time of its arrival there was a hydrophobia panic in the

Straits, and though the animal had never been outside a cage in its life, having been born in captivity, after due consideration the Government officials decided that a Dingo was a Dog and as a Dog could not be admitted to the colony. It was a curious looking animal of a rather dirty white colour, and quite young.

*C. vulpes.*

Two foxes were kept in the Gardens at different times. One was brought from China and appeared somewhat different in colour from an ordinary English fox. It was very active, playing about like a kitten all day. It was allowed a romp on the chain every day for about half an hour which it much enjoyed, but on three occasions when it was allowed this treat after a day or two's intermission it became so excited that it had a fit, and on the third occasion it died in spite of all that could be done. The fox appears to be very liable to fits when young, as similar occurrences are recorded in the account of the animals in the Calcutta Gardens.

The other fox was larger and came from Russia. It lived a long time and was eventually sold. During the hot weather it shed great masses of matted hair, as the Dingo did. At one time it became of a curious grey colour for a short time, as if it was going to put on a white winter coat. Though tame enough to allow the keeper to enter its cage, it would not allow any one to handle it, but tried to bite. It became very friendly with the jackal and used to slip through the bars between the two cages to play with it.

LUTRIDÆ.

*Lutra cinerea.*

The clawless otter lived for some time in the gardens. It was very tame, but like all others used to squeak incessantly for food. It ate fish and meat in great quantities, and eventually died suddenly from overfeeding. When its skin was taken off for stuffing at the museum it was found to be extremely fat, the fat on its tail being nearly an inch thick.

*L. Sumatrana.*

The Malay otter. One full grown specimen of this otter caught in Singapore was bought for a dollar. It however died in a day or two, having doubtless been injured in capture. Another specimen much younger was on deposit for a time, it was quite tame and allowed itself to be handled. Like *L. cinerea* it squeaked and squealed all day if it saw anyone it thought might have something for it to eat.

## URSIDÆ.

*Ursus Malayanus.*

The Honey bear has often been kept in the gardens. The finest was one known as "Jelevu" which was presented by Sir Cecil Clementi Smith. He was very good-natured and would play with anybody, allowing people to wrestle with him, ride on his back or put their hands into his mouth, and never putting forth his great strength so as to hurt. When he had a female given him as a companion, his games with her were much rougher. The two bears would seize each other's skin in their mouths and pull so violently that one would not have thought any skin would stand such rough treatment. He had the greatest aversion to bullocks and especially when he first came used to be perfectly rabid at the sight of one. Horses he took no notice of. On several occasions he broke the chain or collar by which he was attached and escaped at night, but he was easily recaptured, though he had wandered to the further end of the garden. A watchman whom he did not like turned the light of his lantern on him and Jelevu rushed at him. He ran towards the cage and gradually the bear was got up to the cage and put back again. But on later occasions when he got out of his cage he never went far but merely rambled round the other cages, climbed up a tree where he broke off some branches and made a nest which he sat in for a minute or two, and then came down again and was easily induced to return to his cage with the offer of some bread, which he was very fond of. When given anything liquid or juicy he always lay on his back to swallow it so that the juice of sugarcane for instance ran down his throat. On one occasion some sailors gave him

a bottle of beer which as he found it contained liquid, he lay on his back to drink, after which he played with the bottle for some time, balancing it on his hind feet and tossing it about, and then suddenly jumping up and holding it in both paws returned it to the sailors to be filled up again, which created much amusement. He was very powerful and on one occasion broke an iron bar an inch through with ease, and could bite up an inch-plank as easily as a man could bite a piece of soft bread. I have seen trees in the forest with the trunks torn to splinters by wild bears in search of honey. This bear died of pneumonia during a season of influenza when several other animals succumbed. A large female formerly belonging to a resident was presented and given him as a companion. As is often the case in private houses this bear had been so teased by the Chinese servants that its temper was quite spoilt and it took a long time to get her tame again. It was hoped to breed from the pair, but the female suffered from an uterine disease for which nothing could be done, and which proved fatal. A small bear was put in the same cage with Jelevu, and the two were quite friendly for some time but a quarrel took place and the small bear was killed.

The Borneo variety was frequently also on view. It is rather smaller than the Malayan form. In its wild state the bear inhabits low swampy parts of the forests, where I have occasionally come across them, or heard them scurry off. It gives a kind of barking snort when annoyed, and when pleased or sucking its paws it makes a low humming noise. I have also heard near the caves at Kuala Lumpur a peculiar loud humming grunt often repeated which was said to be the cry of a bear which was fully three quarters of a mile away.

*Melursus ursinus.*

A sloth bear was kept for some time in 1875.

RODENTIA.

*Ratufa bicolor.*

Several color forms of this handsome squirrel have been kept. It lives well in captivity and becomes very tame. The

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scarcer brown form *B. affinis* was obtained for the price of a dollar from a Malay at Jurong. It was in very poor condition and died soon after.

*Sciurus Finlaysoni* Horsf.

A very small creamy white squirrel shaded with grey on the back was purchased many years ago from Siam, and lived here till 1905 when it was sold. It probably belonged to this species, but several naturalists who have seen it are doubtful as to what species it belonged to.

*Sc. tenuis*.

The little Malay squirrel, very common in a wild state in the gardens, does not bear captivity well and soon dies.

*Sc. Prevosti*.

Raffles squirrel; makes a very nice pet, becoming quite tame and living long and happily in confinement. Many of these beautiful animals are brought to Singapore where they are sold at from a dollar or a dollar and a half upwards.

*Sc. notatus*.

The brown Malay squirrel with a red belly is very common in the gardens. It bears captivity very well and soon becomes very tame. Specimens caught in the gardens were kept for many years.

*Sc. sp.*

A little grey three-striped squirrel said to have been brought from India, of which four or five were purchased, but not very long after all managed to escape through a hole. Some of them were seen some years afterwards roaming about the gardens, but seem now to have disappeared.

Squirrels can be fed on ground nuts, Indian corn, etc. The chief danger to their life is due to intestinal worms, which often kills them. A betelnut put into the cage now and then prevents this as the squirrels will nibble it themselves and so get rid of the parasites. None have bred in confinement. Most of the kinds

live very happily together in one cage, so that they have a box nest for each one to sleep in. These squirrels make large nests of bastfibre, palmfibre etc., in the trees and are often troublesome in pulling off the cocoanut husk used in fixing orchids on the trees and throwing the orchid down on the ground. These nests are usually placed in the boughs of a tree or among the leaves of a pandanus, or sometimes low down among the thorny leaves of a Bromelia. One nest was made on the leaves beneath the office, and attention was called to it, by the cries of the young squirrels which had been attacked by an army of ants and had fallen from the nest. One had died, the other was put into a cigar-box up in a tree, where the mother squirrel had been heard calling. She quickly came and got into the box, but went away again. When however every one was gone from the building and all was quiet she returned and carried off the young one.

*Rhizomys sumatrensis.*

The Bamboo rat has often been kept, and lives well, but as it can bite its way through most things requires an iron cage. Two lived for a long time in a wooden box lined with tin but eventually bit their way through the bottom, and nearly through the wooden floor before they were found out. One or two escaped and lived in clumps of bamboo for some time. They eat rice, nuts and such food, and also are fond of bamboo shoots to gnaw. The bamboo rat has a curious way of sleeping on its back which gives it the appearance of being dead.

*Hystrix longicauda.*

The Porcupine, is still common in Singapore, and is very easily kept as a pet, eating sweet potatoes, tapioca etc., and some I have seen had a great liking for bones which they nibbled up. It is readily tamed and lives well in captivity. An albino, quite white with pink eyes was purchased some years ago, with it was a young one, normally colored. The young one was still sucking the mother though quite a large



sized animal, and finally took to nibbling off its mother's quills so that it had to be separated. The white one was sent home in 1905 but died on the way.

The animal occurs occasionally still in a wild state in the gardens.

*Atherura macrura.*

The Brush tailed porcupine has been on view in the menagerie twice, one was a very young one and soon contrived to escape. The other was an adult. I obtained it on the Siak river in Sumatra, and during the voyage down the river at night it contrived to escape from its cage and ran up and down the boat. It was easily detected in its attempt to hide, from the powerful muskey scent it exhaled which lasted for some time wherever it had run. It was soon recaptured and lived for some time in the gardens. I have several times come across the animal or its tracks in limestone caves but it also occurs in open country.

*Mus decumanus varalbus.*

White rats were kept on view for some time, and bred easily. They gradually however died out.

*Cavia porcella.*

Guinea pigs, were also kept, but suffer much during the wet season.

UNGULATES.

The elephant has never been kept in the menagerie on account of expense.

*Rhinoceros sumatrensis.*

Three of these were kept temporarily before shipping to the Vienna Zoological Gardens in 1901 and there was one in the gardens as early as 1875. An account of one has been already published in the Journal.

*Tapirus indicus.*

The Malay tapir. A young tapir, the property of the Director lived for many years in the gardens. When bought it had the

black and yellow spotting of the young stage, but after some years put on the black and white coloring of the adult. It was most active in the early morning and late evening. Most of its time it lived in the office or in the Director's house. When the office was opened at 6 o'clock, it would go out and browse along the road side and returning when the sun got hot would be in the office under the table most of the day. Its food consisted of boiled rice with salt, grass, bushes, sweet potatoes and fruit, and it would frequently seek for the abandoned bones which the dogs had left and bit them up. On Saturdays it came up to the Director's house for Sunday, as the office was closed on that day, and went back on Monday morning. There was no need to lead or drive it. When pushed out of the office it galloped of its own accord across the garden, choosing the direction where were the fewest paths as its feet were too soft for the gravel, and jumping all the paths it came to, returning on Monday in the same way. Like the rhinoceros it always dropped its excreta in the same spot each day, so there was no trouble about keeping it in the house.

The cryptic characters of this animal were well shown both in its young and old pelage. When in the former coloring on one occasion it went to sleep in a bush of palms, and when I went to fetch it in on opening the bush and looking down I could not see it. I seemed to be looking on the dark brown ground flecked with spots of sunlight through the leaves. The little animal lay in such a position that the yellow spots were exactly where the vertical sun rays would fall, the yellow streaks resembling the slanting streaks of light from the side. It was for a few minutes quite invisible, though I was looking down on it. The fur at this age is closer and more velvety than in the adult stage. The change is very rapid only taking a few days for the yellow spots to disappear the fur getting scantier and black and the greyish white coloring of the rump developing. It is not less well protected by its coloring when adult and at rest. In the dusk I have seen her sitting on the grass plot, the black fore parts invisible, the greyish white rump exactly resembling a rounded granite boulder, both in shape and colour; seeing it sitting like this with its rump towards me I

could not make out at first what it was as I knew there was no granite boulder on the grass plot.

This tapir was very docile and amusing and was a great attraction, very few people even the Malays ever having seen one before. It was easily trained to draw a small cart, but its feet were too soft for hard roads, and it could only walk comfortably on grass. When very happy it would canter and curvet on the grass neighing like a pony, but its ordinary cry especially if vexed was a whistle which it gave with its trunk. This whistle is the alarm cry which one hears when one comes across them in the forest. It had considerable climbing powers and often walked upstairs. When left alone in a room it sometimes got on a chair and then climbed on to a table. On one occasion when it did this the table which bore on it a pot of white paint, some gum, and ink, collapsed with the weight of the animal who was found standing in a pool of the mixed liquids and covered all over with paint, gum and ink. It was very fond of bathing and used to go down to the lake and remain under water for a considerable time digging in the mud with its paws.

As it got bigger it was found necessary to keep it in an enclosure as there were complaints that it alarmed horses when it was feeding along the road. When shut up, or kept in a stable the tapir here is very liable to pthisis, and this one did not escape. Except that one or two occasions it was heard to give a little cough, and that it got very lazy and also slightly thinner, it showed no signs of illness. But one day it was taken to have its swim in the lake which it much enjoyed and was unwilling to relinquish, and after it came out of the water it went to lie down under a tree as usual, and half an hour later was found to be dead. At the post-mortem the lungs were found to be badly diseased with pthisis, a considerable portion being destroyed. Two other full sized tapirs were temporarily deposited in the gardens, before shipping to Europe, and both died very suddenly with evident signs of severe colic. One which was opened was found to have the stomach full of some bitten up sweet stuff which was almost certainly pineapple, and there was little doubt that some one had given these animals a quantity of pineapples which had proved fatal.

*Anoa depressicornis.*

An example of this interesting animal occasionally brought by Bugis boats from Celebes, was deposited in the gardens by the curator of the museum who had bought it to stuff. It was extremely tame, though occasionally it butted at the keeper when he went into its cage. It lived chiefly on bushes, and throve very well till it was killed for stuffing. Recently I saw a young one in one of the animal shops which was remarkable for being covered with red wool, instead of the smooth black brown hair of the adult.

*Cervulus Muntjac.*

The Kijang. This pretty animal lived and bred very readily in confinement. A pair was procured from Sumatra and they produced eight young all males. It was very remarkable to see how quickly the newborn Kijang developed. The births took place a little before daylight and the little one very soon was staggering about on its legs; by nine o'clock it could stand and walk about quite easily. Indeed on one occasion before seven a.m. a new born one succeeded in getting between the bars of the cage and running away to a wood near by, where it disappeared and was said to have been killed by a pariah dog. The Kijang is a very tame and quiet animal though the males occasionally tried to fight and had to be separated.

Two or three died during my absence in England from what cause I do not know. The others were sold. I believe this animal has never been successfully carried to England as it does not stand a sea-voyage well. Its food is bushes, boughs of waringin, and other trees, sweet potatoes and tapioca roots.

In my account of the Mammals of the Malay peninsula, I stated that it did not occur in Singapore. Since that time however I have seen one female caught at Jurong and heard of others in Bukit Timah and elsewhere.

*Cervus unicolor.*

The Rusa or Sambur. These were constantly kept and bred regularly in confinement but chiefly produced bucks.

Indeed females are not so common in captivity as males. This may perhaps be due to the fact that the female is much more difficult to move about than the male, as it fights violently when attempts are made to catch it and often gets injured or dies of shock. It is curious that the deer which stands injuries from gunshot wounds etc. very easily is very apt to be injured fatally in catching and transshipping. A deer to be conveyed from place to place must never have its feet tied, as if this is done the animal will almost certainly die.

The Sambur buck when adult is often extremely dangerous, and will attack people in a ferocious manner when quite unprovoked. A very fine one which had been brought up from a fawn, on one occasion attacked a cooly from behind who was filling its watertank and threw him to the top of the fence whence he scrambled down, inflicting a number of stabs on his legs and thighs. On another occasion by breaking a bar it got into an enclosure with a black buck which it attacked and lifted and carried about on its antlers. The black buck was rescued and the deer driven back into the enclosure, but taking advantage of the tub of water between the two enclosures being removed, he managed by lying down and wriggling through the small space to get again into the black buck's enclosure and killed it by one stab through the liver.

Deer in the tropics require a mudbath like a buffalo, and delight to wallow in it and cover themselves with mud. I have disturbed them at this refreshment in the forest in Singapore. They also require a dark house or stable to live in or otherwise they are pestered with flies. All attempts to stop this nuisance failed till the idea of making a perfectly dark stable in the enclosure occurred and this was found to be quite effective. The deer were quite free from the flies in the dark, and remained there most of the day. Even wild deer seem to be pestered in this manner. Once in Selangor I saw at a Sakai encampment, a pet doe, which lived loose in the woods and came out only when the Sakais called it and when they did so I observed that a number of these flies (one of the *Muscas*) came with it. A friend who was with me was anxious

to buy this deer, but the Sakai woman would not hear of it as she had brought it up from Java on her own milk and it was one of the family. The deer eat cut grass, bushes, and paddy. The doe produces one young one at a time, which has a couple of white spots on the sides near the rump, which very soon disappear. A number of bucks were bred, and eventually the whole lot were disposed of. Deer suffer occasionally from wounds caused by their cutting their legs in the fences, or by fighting, and these wounds are not very easy to heal, and are liable to get flyblown if care is not taken. A disease resembling foot and mouth, killed several on one occasion and a large doe died after producing a fawn apparently of anæmia, for it was observed when her skin was taken off that she was almost bloodless.

*C. hippelaphus.*

The Sumatran deer, a smaller beast with a golden coloring on the back and a habit of marching about with its head erect, has several times been on view. It is apt to be vicious and constantly tries to butt. It will not breed with the tam-bur, and has not been bred in the gardens menagerie. One, apparently an old beast, after several years went blind in both eyes with cataract and was eventually killed.

*C. sp.*

Philippine deer; one or more species of Philippines deer have been kept in captivity for some years at different dates, but those which have been kept within the last few years were too young to identify specifically.

*C. axis.*

The spotted deer. Formerly often kept in the Straits by Chinese and others, seems to live well. The only one presented to the gardens of late years expired shortly after arrival owing to its legs having been tied.

*Antilope cervicapra.*

The Black buck. This Indian animal has twice been kept, specimens having been presented by various regiments coming



from India. They live well in the Straits, eating grass, paddy etc.

One belonging to one of the regiments proved a nuisance by suddenly charging the men from behind, and when it had damaged eight in this manner, it was sent to the gardens. It was otherwise very quiet and tame. It was killed by a sambur deer as described previously.

*Tragulus napu.*

The large mouse deer often trapped by Malays has been constantly kept in enclosures. These animals had a habit of sitting almost motionless in a corner of their enclosure so that after a time large bony calli appeared on the legs at the joints. This was stopped by giving them a large soft ground enclosure, where there being several together they exercised themselves and lived and bred. Many that are brought in by the Malays are injured by having the sharp canine teeth broken off so as to prevent their biting and from that and other rough handling the poor animals frequently succumb. They eat spinach, sweet potatoes etc. In making their enclosure it is necessary to sink the palings in the ground for some depth as these animals can dig their way out beneath if it is not deep enough. On one occasion I purchased three Napus at Changi, one old and two young ones, which a Malay had had a long time, and brought them down in the same box they had always lived in but while waiting for about half an hour till an enclosure was got ready for them, unexpectedly the old female attacked the young ones and bit off their noses and ears, killing them, what provoked this maniacal attack I could not guess.

*T. javanicus.*

The Kanchil, resembles the Napu but is smaller and brown-er. It is about as common but less frequently brought into captivity, probably being more delicate and easily injured.

*T. stauleyanus.*

Is a Pelandok, as big as the Napu but of a bright foxy red. Its locality is said to be Rhio, but the species is only known

from specimens imported into Singapore by natives. Its habits in confinement are those of the Napu. It has several times been on view.

*Sus cristatus.*

The wild boar. Does not live at all well in captivity young ones have been brought several times to the gardens but soon died. The only one that I ever saw kept well as a pet was at a house in Selangor where it ran about the garden loose. I have seen Chinese pigs which had been allowed to cross with wild pigs in the forest the young of which did as well as ordinary pigs. There seems to be some doubt as to whether this species is identical with the Indian pig. It is still abundant in Singapore and some years ago a large wild boar invaded the gardens, and remained in the garden jungle for some days. A hunt was organized for it but it had got away before.

EDENTATA.

*Manis javanica.*

The scaly anteater is common in Singapore and has occasionally been caught in the gardens. It lives underground all day coming out of its burrows at night, when it is caught. It has often been on view for a few days in the garden's menagerie, but is impossible to keep. Its great strength and powers of digging make it difficult to retain in ordinary enclosures and it refuses to eat anything but termites, chopped meat and eggs which others of the order eat readily it will not touch. Adults and young ones of both sexes have been kept for a few days only. The young ones are very curious being pink, and climbing about their mother in an odd way.

MARSUPIALIA.

A number of Australian marsupials have been on view at different times, but the records and identifications of many have not been preserved. Kangaroos were kept as early as 1875 and among the species on view later were *Macropus giganteus*,

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and *M. rufus*, and ? *ualabatus*, and several smaller species were also kept. Kangaroos do not thrive in this country on account of the damp which appears to cause diarrhœa. Two very fine black Wallabies were sent by Mr. Le Souef from the Perth Gardens in Australia. They arrived in the wet season, and though most carefully housed and fed on dry food, both died in a few days from diarrhœa. The smaller Kangaroo rats lived much longer. One however a charming little animal the day after it came in hopping about the cage at night must have overlooked the wire fencing and struck its head against it. It was found partly paralyzed next morning and though it lived for some time all pains taken with it produced no improvements and it eventually died. Three common Dasyures (*Dasyurus Geoffroyi*) lived for some time, but the climate did not seem to suit them well. A fine Cuscus, *Phalangista ursinus* was presented to the gardens some years ago, but owing to the long voyage it suffered from diarrhœa and it succumbed shortly. The Australian opossum, *Trichosurus vulpecula* proved the easiest marsupial to keep. A pair presented in 1898 which had long lived in captivity and were quite old lived long in the gardens and bred regularly. They were only lively at night, sleeping most of the day. Though the old pair were very friendly to each other, they occasionally got up little squabbles about places on a perch or food, and after swearing at each other would curl up together and go to sleep. Nearly all suffered sooner or later from ulceration of the tip of the tail, which was treated with idoform, and usually healed readily, though the tip often died off.

#### BIRDS.

The record of the large number of birds of different kinds kept in the aviaries is very incomplete, as owing to difficulties in identifying them in the early days, they were often simply recorded by simple names, such as parrots, pigeons, etc. No attempt was made to keep insectivorous birds as there was no means of properly feeding them, and the expense of keeping a cooly to catch insects for them would have been too great. The gardens themselves abound in birds of all kinds which

find there a refuge from the shooter and trapper, and some account of those observed was published by the author in Natural Science.

The following is as complete a list of what have been kept in the aviaries as can be procured.

ORIOOLIDÆ.

*Oriolus xanthonotus* Horsf.

Malay Oriole, presented by the Duke of Newcastle, lived for some time.

EULABIDÆ.

*Eulabes intermedia* Hav.

The Tiong. Common in a wild state and occasionally nesting in the gardens.

*Acridotheres* sp.

Javanese Mynah, a very tame little bird, which readily talks. It lived for many years, and was eventually killed by a rat.

ALCEDINIDÆ.

*Halcyon smyrnensis*.

A bird of what I think was this species was brought alive having been caught in a spider's web. It was very restless and found impossible to keep alive.

PASSERINI.

*Padda oryzivora*.

Java sparrow. Was introduced to the gardens many years ago under the impression that it was insectivorous and established itself there. This graminivorous bird was distributed to various parts of the peninsula where it has settled down but never goes far from where it was first turned out.

BUCEROTIDÆ.

*Buceros Rhinoceros*.

The Rhinoceros Hornbill. One or two were kept at different times.

*Authracoceras malabaricus.*

*Craniorrhinus corrugatus.*

*Anorrhinus galeritus.*

These Hornbills live on fruit, bread and small birds. They were very fond of mice. One was very clever at catching sparrows when they flew through its cage. It would play with its victim for a time and then swallow it. They are apt to die very suddenly from no distinct cause.

#### PSITTACI.

*Lorius domicella.*

*L. flavopalliatu.*

*L. garrulus.*

A number of these gay coloured birds are brought by the Bugis men for sale.

*Cacatua galerita.*

The Sulphur crested Cockatoo was frequently kept.

*C. moluccensis.*

Large Cockatoo. One specimen lived for upwards of twenty years and is still alive.

*C. sulphurea.*

Lesser sulphur crest kept in 1880.

*C. rosacea.*

Rosy Cockatoo, has been kept for some time.

*Palæornis longicauda.*

The common parrakeet, does not live well in captivity. It is common wild in the gardens.

*Calopsitta novæ hollandiæ.*

Lived well for some time.

*Electus viridis, E. pectoralis and E. linnaei.*

The Eclecti are often brought by Bugis men.

*Eos fuscata.*

*Psittinus incertus* Shaw.

The Pialing, is rather a dull stolid bird, sitting perched on the top of a stick the whole day.

*Trichoglossus cyanogramma.*

*Loriculus galgulus.*

The Serindit lives best in a small cage of rattan. It is a quiet little bird, chiefly attractive for its curious way of sleeping suspended by its claws to the top of the cage with its head hanging down like a bat.

#### GALLINÆ.

*Pavo muticus.*

The Malay pea-fowl, has several times been kept. Young birds are very difficult to keep, but full grown birds live well. One or two used to wander loose in the gardens, but disappeared either killed by musangs or stolen by natives. One very fine peacock was found dead in its cage one morning, with a punctured wound near the eye. This it was surmised was caused by a blow from the beak of pheasant which lived in the next cage.

*Argasianus argus.*

The argus pheasant and the Borneo-Argus have both been kept. The argus pheasants do not live well in captivity.

*Polyplectron bicalcaratum.*

Peacock pheasant, was in the aviary as early as 1875 but of late years none were obtained.

*Numida meleagris.*

The Guinea fowl lived for a number of years, and one at least must from its appearance have been very old when it died.

*Gallus varius.*

Javanese wildfowl. Cock birds lived well and long, hens seemed more delicate.



*G. atroviolaceus.*

This beautiful chicken was described by Lieut. Kelsall from specimens brought to Singapore from an unknown locality. Another pair was seen brought in for sale in one of the animal shops, but it has not been seen since. It lived for some time in the gardens. Its habitat is not known.

*G. bankiva* vars.

Japanese fowl have been on view, and also several monstrous chickens with three or four legs. One cock had an extra half pelvis and complete leg, and a hen had two legs projecting out straight behind it. Another curious monstrosity was a cock which walked so erect that its tail touched the ground between the legs. These monstrosities, by no means rare in the east, are very attractive to natives, quite a large number were brought to the earlier agricultural shows in Penang.

*Phasianus Reevesi.*

Reeves Bartail pheasant.

*Euplocamus Veilloti.*

Often obtained ; a handsome long lived bird.

*E. Horsfelde.**E. nycthemerus.*

The silver pheasant. Lived well for some years.

*E. proelatus.*

Siamese pheasant. This beautiful bird did not live long as it was killed by a rat not long after it was obtained.

*E. nobilis.*

Borneo Fireback (1880).

*Thaumalia picta.*

Golden pheasant.

*Acomus erythroptalmus.*

Rufous tailed pheasant. This handsome bird lives easily and long.

*Rollulus roul-roul.*

The green partridge lives tolerably well, but is very shy concealing itself in its box at the sight of visitors. They are liable to the attacks of a bird louse which crowd round the head and neck and seem always if neglected to prove fatal. The same parasite attacks and kills *calaelus nicobarica*.

*Caccabis chukar.*

The Indian partridge presented lived for a year or two.

*Rhizothera longirostris.*

The large partridge lives long and well. On one occasion a couple which had been kept in cages apart for a long time by a resident was presented to the gardens, as they were of different sexes and always calling to each other, it was assumed that they would live happily together but shortly after having been put into the same enclosure, on the absence of the keeper, the cock bird attacked the female and so pecked its head that it died.

*Coturnix* sp.

The button quail is brought in large numbers from India for food, but did not thrive when put into an open enclosure, as they seemed to suffer from damp.

*Coturnix communis.*

Common quail was in the aviaries in 1880.

## RALLIDÆ.

*Erythra phoenicurus.*

The common water rail is frequently caught as it not rarely flies into houses at night attracted by the light, most so caught lived but a short time but some presented by Mr. Down lived long, and some are still living. It is common in a wild state in the garden where it often nests.

*Porphyrion Edwardsi.*

The purple coot, lived a very long time in captivity. The feet of these birds are apt to get swollen if the floor of the cage is of stone or cement.

*P. sp.*

From China. A dull blackish coot often kept as a pet by Chinese. Three birds have been presented, but two were killed and swallowed by a Python which found its way into the cage. I failed to identify this species.

#### CHARADRIDÆ.

*Numenius phaeopus.*

The Whimbrel. A specimen sent from Egypt lived but a short time.

#### PELECANIDÆ.

*Pelecanus Philippinensis.*

The grey pelican, has lived long in captivity. One specimen was caught in the harbour.

*P. roseus.*

A single bird was sent from the museum, which had been brought in by a Chinaman who had wounded it with a full charge of shot in the back. Of this injury it recovered completely in a few weeks and became a very fine bird. It was eventually sent to the museum again.

*P. sp.*

Two of these birds were found being carried about in a rickshaw by a Chinaman, who had missed the owner. The police sent them to the aviary where they remained for a long time, and were never claimed.

#### FREGATIDÆ.

*Attagen minor.*

This rather rare frigate bird lived long in captivity, but was finally killed by an adjutant who shared its cage and with whom it was on good terms. Some quarrel arose between the birds when no one was by and the adjutant broke the skull of the frigate bird with a blow of its beak.

*A. sp.*

A specimen bought for five dollars from a Malay in 1904 is still alive. These birds are the easiest of the sea birds to keep in captivity.

#### SULIDÆ.

*Sula fiber.*

The brown booby lived a long time in captivity. It was found that after a time in its enclosure its feet became stiff and it could not walk. This was cured easily by allowing it at intervals to swim in the lake with a string attached to it, which it much enjoyed.

*Leptoptilus Argala.*

The Indian adjutant. One example of this bird was kept for some time.

*L. javanica.*

The common adjutant. This bird is very long-lived and one has been in captivity for over 20 years, as no one seems to know when it came. Most of the birds brought in have been wounded by shot and the old one had its wing broken and never repaired. One which was sent to the gardens appeared to be in excellent condition but refused to eat, and died in a couple of days. It was found to have received a complete charge of shot in the abdomen. The adjutants eat meat, fish, rats and any vermin.

#### ANATIDÆ.

*Cygnus alor.*

White swans were kept for many years on the lake but both of the two last disappeared and were supposed to have been stolen.

*C. atratus.*

The Australian black swan has always been kept on the lake and not rarely bred, making a large nest of rotten leaves fished up from the bottom of the lake by the cock bird which

threw them to the hen who arranged them by stamping on them with her feet. The young birds however were often destroyed by eagles and hawks. When a pair of swans occupied the lake they would not allow a new comer there but chased it off. They often left the lake to crop the grass on the grass plots, and one while crossing the road was run over by a carriage and its leg nearly cut off. The leg had to be removed, and the swan recovered and lived for many years, and though it could no longer walk as before, it used to wriggle along on its belly on the grass plots and so get the grass it liked.

Two were killed and eaten by a large python, on two successive months. On the occasion of the second disappearance of the swan a hunt was organised and the python 18 feet long was found on the Island in the lake and shot with the swan still inside it. The head of the swan had been crushed by the jaws of the snake, but the body was entire, giving the snake a remarkable appearance reminding one of a *Plesiosaurus*.

#### *Dendrocygna javanica*

The whistling teal, was constantly kept on the lake and used to nest, and rear young which however were often destroyed by eagles and kites. At one time when there was a crocodile in the lake, the teal used to roost each night on the leaves of the *Victoria Regia* water lily, and frequently laid eggs there. Though the wings of these ducks were cut at first so that they could not fly they used commonly to take long flights when the feathers grew again, and they could not be recaptured, and either flew far away or fell victims to would-be sportsmen.

#### *Nettopus coromandelianus*.

The goose teal, used for many years to frequent the lake in the spring, but would only remain a few weeks on passage.

#### *Aix sponsa*.

Mandarin Duck a pair was presented to the gardens but did not live long.

*Anas boschas* var.

Three Bali ducks were for a long time on the lake having been presented by Mr. Balfour Lees. The peculiarity of this bird consists of its curious erect habit when walking. It stands as erect as a penguin, whence it is often known as the penguin duck. A number of ducks of different kinds were sent on one occasion from Egypt, of these only two arrived alive, a widgeon (*Mareca penelope*) and a tufted duck, *Fuligula cristata* both were put on the lake, but remained there but a short time, and then disappeared.

#### STRIGES.

*Ketupa javanensis* Lam.

The Fishing owl. These are very long-lived owls and those in the gardens have been there 16 or more years.

*Bubo orientalis*.

Was on view several times.

*Ninox scutulata*.

The little Hawk owl lives but a short time in captivity.

*Scops bakkamaenus*.

This and one or two other small owls were kept for a short time.

*Asio accipitrinus*.

The short-eared owl. One caught in Singapore (the only one recorded from the peninsula) lived for some time in the gardens.

#### ACCIPITRES.

*Hieratus pennatus*.

A pair of these were found fighting in the gardens and a cooly caught one under his coat. It was transferred apparently none the worse to a cage in which was a large Sea-eagle. On being fed, the little eagle left its own piece of meat and tried to rob the Sea-eagle, who resisted and caught the small bird by the wings. It was quickly rescued, and transferred to another cage where it rearranged its plumage, erected its crest



and seemed quite happy. Next morning after being fed it fell dead. At the post mortem examination it was found that the liver and other viscera had been cut through in several places during the first fight. Though it had showed no signs of any injury till its sudden death.

*Lophiotriorchis Kieneri.*

This beautiful bird was caught attacking the pigeons of a resident who sent it to the aviary, but not long afterwards owing to the carelessness of a cooly it escaped.

*Spizaetus Horsfieldi.*

Horsfield's Eagle is common in Singapore. This fine black Eagle has often been caught but never seems to get tame, constantly dashing against the wires of its cage.

*Haliæetus leucoryphus.*

Mace's Sea Eagle. A specimen was kept for very many years, how long was not known. It showed signs of great age, and in trying to bathe in too small a tank injured its wing. The wound refused to heal and the bird had to be killed.

*H. leucogaster.*

The common Sea-Eagle, has been caught several times in the gardens and by residents and kept in the aviaries for a long period. It lives very well in captivity.

*Haliastur indus.*

Brahminy Kite. Often caught young, and has lived for many years.

*Spilornis bacha.*

A common hawk has often been presented to the gardens and lived fairly long.

*Accipiter virgatus.*

The common Sparrow-hawk, has been often caught and kept. It has been captured close to the aviary pouncing on a grass lizard. It is very restless in captivity dashing against the bars of the cage and seldom lives long.

## COLUMBÆ.

*Osmotreron vernans.*

The green pigeon can never be kept long in confinement as it refuses to feed.

*Carpophaga oenea.*

The Pergam, lives well and long.

*C. insularis.*

This pretty pigeon from the Nicobars lives easily but is seldom procurable.

*C. whartoni.*

The Christians Island pigeon is difficult to keep as it refuses most kinds of food.

*C. sylvatica.*

Indian fruit Pigeon kept in 1880.

*Myristicivora bicolor.*

The Rawei. This beautiful black and white pigeon well in captivity.

*Calaenas nicobarica*

A pretty bird easily kept. It is a very quiet bird hardly moving about. At night, it seems to be more lively and some kept at the Director's house always made a kind of cooing noise at about 9 o'clock at night. It is often brought by natives to Singapore. It feeds chiefly on paddy.

*Chalcophaps indica.*

A number of these pretty pigeons were put in a cage in the aviary, but owing to the fall of a bit of board all escaped. They however settled down in the gardens where they may be often seen.

*Columbia livia.*

Rock-pigeon kept in 1880.

*Butreron capelli*.

Five of these birds were sent from Johore in 1905, but refused to feed.

*Goura coronata*.

The Victoria crowned pigeon, lives very well in captivity. Some obtained about 1875 lived for about 16 years. Of two presented later one died of some disease resembling gapes which at that time was very prevalent among domestic fowls.

*Turtur tigrina* and *Geopelia striata* are both very common in the Gardens in a wild state.

*Macropygia assimilis*.

Two examples of this brown pigeon were kept in 1880.

#### LARIDÆ.

A large gull, perhaps the glaucous gull *Larus* was received with other birds from Egypt and lived for some years. Although it ate fish, it chiefly lived towards the end of its life on bananas, which it evidently much preferred.

#### PHOENICOPTERI.

*Phoenicopterus roseus*.

The flamingo. Several of these birds were received from Egypt, and were put in an enclosure on the lake but they were attacked by the large water turtles, (*Trionyx*) with which the lake was infested and some being killed, the others were removed to an enclosure in the aviary, but they did not thrive and all died.

#### IBIDÆ.

*Ibis melanocephalus*.

The black-headed Ibis, was presented in 1903, it was in young plumage but shortly developed its white feathers and dusky head. It is still alive.

## ARDEIDÆ.

*Ardea sumatrana.*

The large blue heron two of these birds have lived for a very long time in the Gardens, one about 20 years. The second about 15. This latter was caught young at Changi and brought up by Malays. It used to go to fish along the sea-coast every day and return to the house at night. This heron makes a strange booming noise constantly, holding its head erect and dilating its throat. The female has laid eggs several times in the aviaries but the rats have usually destroyed them.

*Bubulons coromandus.*

The Cattle egret lives well and long in captivity. One has been kept since 1892, another was obtained later. I have seen them kept as pets by the Akits a race of Sumatrans who live on rafts in the Siak river, and catch fish. This bird produces its beautiful egret feathers once a year in spring and they can be easily removed when ready to shed without injury to the bird. The two birds were at one time put into the same cage but fought viciously, one receiving some damage to its head.

## CICONIDÆ.

*Dissemurus episcopus.*

This handsome stork was represented by two young birds sent from Pahang which lived and grew very well in confinement till they attained their full coloring. They were both killed by a curious accident. A swarm of bees took up its abode in the bushes close to the aviary, and as they were troublesome, the coolies attempted to destroy the comb. The bees flew about the aviary in swarms but none of the birds took any notice of them except the storks which snapped at them, and some of the bees getting into their mouths stung them in the throat and both died the following day.

*Nycteria Jabiru.*

The Jabiru two of these fine birds were presented in 1899 and lived for some years when one died. The other is still living.

Two white Indian storks were presented in 1901, one of which had its beak so bent by some accident that it could not feed itself, and had to be fed by hand. A temporarily employed keeper unaware of this did not do so and the bird eventually died. The other is still living.

## RATITÆ.

*Dromaeus Novæ-Hollandiæ.*

The Emu. These birds were kept from 1875 onwards. One pair in the Gardens bred in 1892 and the female laid one egg, unfortunately broken by accident by the male. Not long afterwards the male accidentally got his neck caught in the woodwork of his cage and though released quickly died in a few minutes perhaps from shock. The female was sold some years later.

*Casuaris uniappendiculatus.*

A female of this rare Ceram Cassowary was presented in 1891, and died in 1905 apparently of old age. It lived on bread, sweet-potatoe and the cobs of maize after the squirrels had eaten the grains off them.

*C. sp.*

Five young birds from New Guinea were purchased some years ago, and kept in an enclosure, but had to be separated as they fought. They were eventually sold.

## REPTILES.

*Trionyx carilagineus.*

The water turtle, caught in the lake lived many years. It is not only carnivarous, living on fish and frogs, but eats also paddy and boiled rice made up into balls. They evidently breed in the lake, as they became abundant at one time and killed the flamingos by biting their legs. They were caught by a large wire trap with a falling door baited with dead birds.

*Testudo emys.*

The large Malay land tortoise. One was caught by myself in Johor, another in the Dindings and a third was presented

to the Gardens. They ate kang kong (*Ipomea aquatica*). They lived long and were eventually sold.

*Testudo amboinensis*.

The common box-tortoise, chiefly specimen, caught in Singapore, lived well eating kang-kong. These animals used not rarely to lay eggs, 2 at a time, very large for the size of the animal, oblong white with very hard thick shells. They deposited them in a corner of the enclosure and partly covered them with sand. None were ever hatched.

*Daimonia subtrijuga*.

The Siamese tortoise presented by Capt. Flower, lived but a short time and would not feed. It was discovered later that it ate exclusively a blue mussel, unprocurable in Singapore.

*Geomyda spinosa* Gray.

The red jungle tortoise, common on Bukit Timah, lived easily in captivity. It eats leaves of kang kong etc. I have found it eating agarics in the forests.

*Cyclemys platynota* Gray.

The flatbacked tortoise, caught in Singapore, is a dull dirty looking tortoise which spends almost all its time under the water.

*Chelone imbricata*.

The Hawk's bill turtle. A number of small ones were presented to the gardens, but lived a short time only, as apparently the fresh water was not suitable for them and their feet became diseased. A larger one was obtained later, which its former owner said refused food of all kinds. It was found that it could not eat whole fish but if they were cut into bits it ate them. It lived for some months only, swimming very briskly about its tank but it appears these animals require sea water.



*Crocodilus porosus.*

The common crocodile, is easily procured and easily kept. One brought to the gardens and left tied up for a short time managed to escape into the lake where it grew to a length of 6 or 7 feet, and became troublesome, destroying the waterfowl and eventually commenced trying to seize the coolies drawing water. All kinds of methods were resorted to destroy it. It was twice wounded with shot, and both arsenic and strychnine were administered to it in chickens. Attempts were made to net it, and to catch it with hooks and bamboo spikes fastened to chickens and also to destroy it with dynamite. All proved unsuccessful, and finally the lake was drained nearly dry and attempts made to find and shoot or spear it, but it concealed itself in the mud, and during the night escaped from the lake and was never seen or heard of again. Another was kept in a tank for a considerable time, and became tame enough to come to the side whenever it was called, but was always vicious when the keeper entered the enclosure. On one occasion a visitor thrust a stick into its mouth which broke and a portion lodged transversely across its throat. This was with some difficulty extracted, but caused an abscess behind the base of the ramus of the jaw which penetrated through causing a large hole from the outside into its throat. The animal refused food for a few days, and the wound commenced to heal and in a surprisingly short time the damage was quite repaired. The crocodile lived till it was sold in 1904.

*Hydrosaurus salvator.*

The Biawak or Monitor has often been kept. It is common in Singapore, and one was actually caught in a godown in the town, having apparently come up a drain from the river. It was in a very poor starved condition. This lizard attains a very large size and is destructive to poultry. A large one living near the lake killed some Siamese teal and a black swan in 1888 before it was destroyed. One of no great size which had escaped from a cage nearly caused the death of the cooly who recaptured it. It had climbed up a tree, and he ascended the tree and noosed it with a string noose on a stick, but when he

jerked it from its hold it fell and as it did so struck him with its sharp claws on the ankle, cutting an artery from which he nearly bled to death. The Biawak eats meat, fish, frogs, rats, etc., when given a rat it shakes it violently like a dog, and then crushes the body from head to tail in its jaws till all the bones are broken when it swallows it whole, head first, when defending itself it slashes about with its long wiry tail, inflicting sharp blows. In captivity the animal constantly pushes its nose against the wire netting so that after being in confinement for some time most of them have the skin of the nose rubbed away. It much enjoys lying in a water tank, though it does very well without one. This animal lays its eggs in holes of no great depth in sandy places. I have seen quite a number so engaged.

#### OPHIDIL

Though many kinds of the smaller snakes are abundant in Singapore and often caught in or near the gardens, few have been kept for any length of time in the aviaries, on account of the absence of a proper house for them. Glass boxes such as are used in most menageries are very hot, unless put in a properly cool house, and feeding these small snakes requires a supply of frogs and mice which would entail an extra cooly to catch them. Some of them have been kept for a short time after capture and later sent to the Museum or given away to collectors.

The following were on view from time to time.

*Dipsadomorphus dendrophilus.*

*D. Cynodon.*

*Chrysopelaea ornata.*

*Dryophis prasina.*

*Bungarus fasciatus.*

This poisonous snake was kept for some time. It is very handsome with its black and yellow rings, but very vicious readily striking at any one. It has a habit of rapidly beating

its tail on the ground when annoyed, making a rattling sound, apparently as a warning. *Callophis gracilis*. Also a poisonous snake does the same. The specimen exhibited came from Pahang.

*Naja tripudians*.

The black cobra a common snake in the gardens has often been exhibited, but seldom lives long in captivity. Many possibly were injured in capture. It does not feed very readily in captivity, but will eat mice and small birds, and frogs. Its habit of spitting its venom into the eyes of people approaching too near it makes it a dangerous animal to keep in a close wire cage, and it seemed to suffer from heat in a glass box.

*N. bungarus*.

The Hamadryad. Small specimens caught in the gardens were exhibited on several occasions. One was caught eating a small python, and transferred to a cage but it refused to continue its meal, and others obtained refused to feed though snakes, eggs, mice, frogs and other food was offered.

This snake is now apparently rare in Singapore, none have been brought in for a long time. The last I saw was a moderately large one brought in a box by two little Malay boys who had caught it near the Barracks. They had no idea it was a dangerous snake.

*Lachesis Wagleri*.

The green viper. This has often been exhibited being a common and handsome snake, beautifully marked with black, yellow, green and prussian blue. It lives well in captivity and also breeds, producing 5 to 9 young at a time. As of course is well known to most people, the young are born free and not deposited in the form of eggs. The green viper eats rats of quite large size, birds, lizards and frogs. There is always a little difficulty in rearing young ones, as they require very small lizards for their food which are difficult to catch but some have been brought up. It is a quiet snake lying quite still on a branch for hours together. On two occasions coolies

in the gardens have been bitten by young green vipers which had fallen from a tree and been stepped on. The bite is not fatal but gives a good deal of pain for a few hours, the inflammation being about as bad as that of a scorpion sting. A native who possessed a large pariah dog, allowed a very large fresh-caught green viper to bite the dog on the thigh. A dog uttered a shriek and ran away, returning quite well in about two hours and none the worse. A sparrow was put into the cage of a green viper and flew about taking no notice of the snake, till the viper suddenly struck it on the thigh, and the blood immediately flowed. The bird flew away to the end of the cage but did not seem at all affected by the poison. The snake followed it up and struck at it again seizing its head in its mouth and crushing it at once. As had the bird been free it could easily have flown out of the snakes reach before the snake caught it again, the action of the poison does not appear to be of much value to the reptile.

*Python curtus.*

The little red python, a short thick red and grey snake formerly considered very rare is not at all uncommon in the forests of Bukit Timah, and has often been exhibited. It is a sluggish snake unless it means to strike which it does with lightning like rapidity. It feeds on rats and mice and will take milk occasionally. It only requires feeding once a month as a rule.

*Python reticulatus.*

The Python is one of the commonest snakes in Singapore. And specimens of every size up to 26 feet long have been constantly exhibited in the aviaries. Very large ones have also been seen and killed also in a wild state in the gardens, and small one have occasionally found their way into the aviary cages and devoured some of the birds, and being afterwards unable to escape by the small hole by which they entered were captured on the following morning. Like many snakes the python is nocturnal remaining quiet all day and going out in search of food at night. Young pythons eat rats and birds, and small to middle sized pythons are common visitors

to fowl houses where they often kill more fowls than they eat. One of about 12 or 15 feet brought to the gardens for sale was said to contain no less than 12 ducks. Large pythons in the forest live on deer, pigs and other game of that kind. Small sized pythons usually feed once a month. The large ones over 20 feet long, usually once in from six to nine months. One which was about 22 feet long, not long after it was brought in passed the remains of a deer. It fed again some time later on three chickens, and remained without food for six months when it passed the remains of the fowls and then ate a good sized pariah dog, which lasted it for 9 months. There is very little difficulty in inducing the python to live on dead food, though naturally they kill their own prey. At first however they not rarely refuse a dead chicken or rat. Live animals such as fowls if put into a cage with a python are never alarmed at it, at least until it moves about; the fowls perch on the snake and clean their feathers, the rats burrow down among the coils of the snake and seem quite contented. The mythical fascination of the reptile does not exist except in poetical imagination. If the python is hungry—he usually stretches himself, looks fixedly at his prey which take no notice whatever of them. There is a rapid motion of the head and fore part of the snake, so rapid that it is impossible to see what happens, and the prey is encircled by a coil and a half of the snake's neck with its head firmly held and crushed in its mouth. The stroke is one of the most rapid things I have seen, and it is impossible for the prey to be killed quicker in any way.

If the food is dead he examines it carefully all over and taking it in his coils pushes it head first into his mouth. All snakes I believe swallow the prey head first, and I found once in a wood in Selangor a curious frog so marked that its tail end looked like the head. So that if a snake came and attempted to seize the frog by what was apparently its head, the frog at one spring would be out of the way. The python, especially large ones, only feed at night, and they shew signs of hunger by restlessly moving about the cage. They much object to being looked at or annoyed during their slow swallowing of the prey, and if disturbed will reject the food even if partially swallowed



and will not feed again. Almost any snakes of any size will eat smaller ones. I have seen *Doliophis trivirgatus* eating a small brown snake, and the python will also occasionally do the same.

On one occasion there were five fair sized pythons put into one large cage. The biggest, a very thick snake, was about 25 feet long, the next in size seventeen feet, the others 12 to 15 feet. But during the first two nights the big snake ate the three smaller snakes, and had a try at the other who beat it off though it was slightly wounded. After this the two snakes lived at opposite ends of the cage. The large one was particularly vicious and it was unsafe for the keeper to go into its cage.

The python requires to be supplied with some arrangement for bathing, as it is very fond of water and suffers much if kept in too hot and dry a place, especially when it is changing its skin a dangerous time for any snake.

As a rule in spite of their great strength and weight these big snakes are easy to handle as in a struggle they soon get tired. One day one 21 feet long escaped from its cage and took refuge in a wood. As a little rain had fallen it was easily tracked by the broad bar across the road which it had made when passing. It was noosed by a running noose by one of the coolies and of course lashed out and fought furiously for a few minutes, but the other coolies about 20 in number seized it by the tail and body in a row and it was carried along, in spite of its struggles. It showed great ingenuity in getting a kink of its body against a tree and pulling on that, but eventually became quieter and was quite exhausted by the time it was brought to its cage. However it soon recovered, and lived for some time being finally killed by one of those pests to a menagerie, the man who cannot see an animal in a cage however tame without jobbing it with a stick. The man was arrested and fined, but the snake never recovered from the comparatively slight wounds it received. In noosing a snake the captor must wait till it raises its head, which it will generally do when threatened, and he must not miss slipping the noose over its head at the right moment or the snake will understand and dodge



the noose afterwards every time. When noosed and the snake begins to fight, care must be taken not to get the noose too tight, but play the snake like a fish if it fights much, as it soon gives up. A python can bite severely and its strong recurved teeth make a very bad wound, especially as it will not let go. Two Malays were carrying one through the streets and the one behind who was carrying the head end dropped it, it swung downwards and seized the calf of the leg of the Malay in front, lacerating it severely. I believe the snake's head had to be cut off before the Malay could be released.

Many years ago a python in the cage at the gardens, attacked its keeper. He was an European and went into the cage in a state of intoxication to show off the snake. The snake about 15 feet long, was annoyed and seized him, getting a coil or two round him. Assistance was procured and the snake was got off, but the man was marked all over the body with bruises as if he had been beaten with a thick stick. Had the snake been really intending to crush him, doubtless he would have had some ribs broken at least.

The python has never bread in captivity in the gardens, but one new caught one laid a large number of eggs on one occasion, now of which however hatched.

The flesh of the python is eaten by Chinese, and oil from the fat is in much request by Malays as a medicine for rheumatism.

#### REPTILES OCCURRING IN A WILD STATE IN THE GARDEN.

The following reptiles have been seen in the gardens in a wild state from time to time.

##### TORTOISES.

*Trionyx cartilaginens.* In the lakes.

*Cyclemys platynota.* In the lakes once.

*Testudo ambomensis.* Swamp economic garden.

##### LIZARDS.

*Aelurbscalabotus felinus.*

Rare, in the economic gardens.

*Gehyra mutilata.*

Common in houses.

*Gecko monarchus.*

Common in aviaries.

*Draco volans.*

At certain times the flying lizards came to the gardens in numbers, and may be seen flying from tree to tree in the hot part of the day. They seem to have regular routes across the gardens, and a few days after their appearance they disappear again, and none are to be seen for some months.

*Calotes cristatellus.*

The chamooleon lizard is very common.

*Varanus salvator.*

Not seen of late years, though still common in Singapore.

*Mabuia multifasciata.*

The common scinc, abundant.

#### SNAKES.

*Typhlops braminus.*

The Burrowing snake not rare.

*Python reticulatus.*

Common.

*Cylindrophis rufus.*

Common.

*Chersydrus granulatus.*

A dirty looking aquatic snake, found entering the garden (1898) after a spell of very hot weather apparently seeking water.

*Tropidonotus piscator.*

Occasionally in wet spots.

*Macropisthodon rhodomelas.*

A little red snake very common in the grass.

*Coluber melanurus.*

Not rare.

*Coluber oxycephalus.*

Occasionally.

*Dendrolapthus caudolineatus.*

Very common.

*Simotes octolineatus.*

Common.

*S. signatus.*

Under tiles near the office 1898.

*Homalopsis buccata.*

In mud. Economic gardens.

*Dryophis prasinus.*

Very common tree snake.

*Chryopelea ornata.*

Common.

*Naia tripudians.*

Common.

*N. bungarus.*

Now rare.

*Callophis gracilis.*

Not very common.

*Doliophis bivirgatus.*

Rare.

*Lachesis Wagleri.*

Common.

BATRACHIANS.

*Rana macrodon.*

Formerly common but much-sought for food by the Klings.

*R. erythroea.*

Common in the ponds.

*R. labialis.*

Common do.

*R. leucomystax.*

Common depositing its spawn in the waterbutts

*R. limnocharis.*

In the ponds.

*Callula pulchra.*

The Bullfrog, very common.

*Bufo melanostictus.*

The common Toad very abundant.